Introduction to EPA's Office of Research and Development (ORD)

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Associate Director for Science

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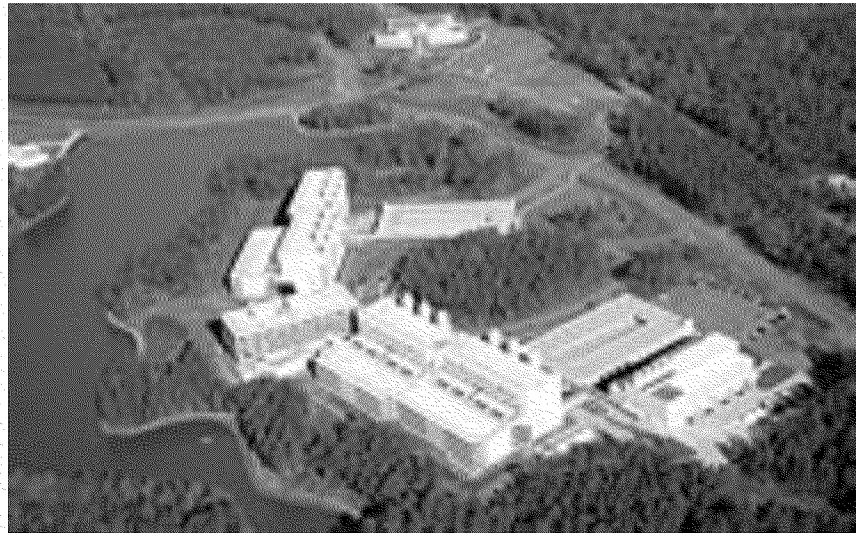
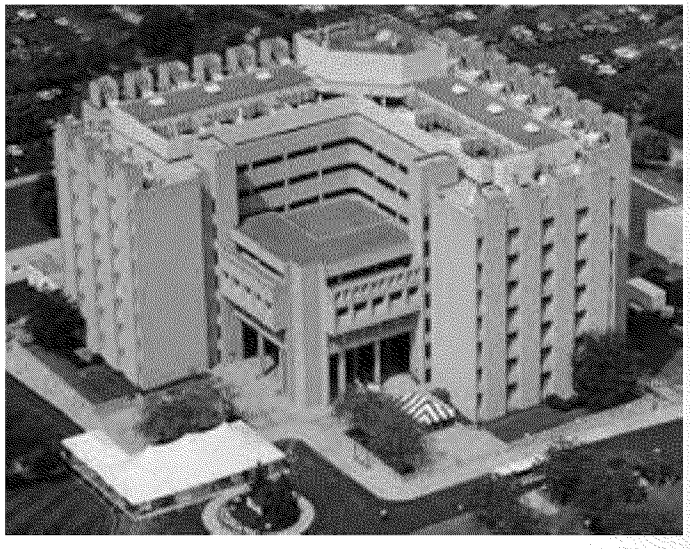
Research & Development Mission

Provide the science, technical support, technology, and tools to inform EPA's mission to protect public health and the environment.

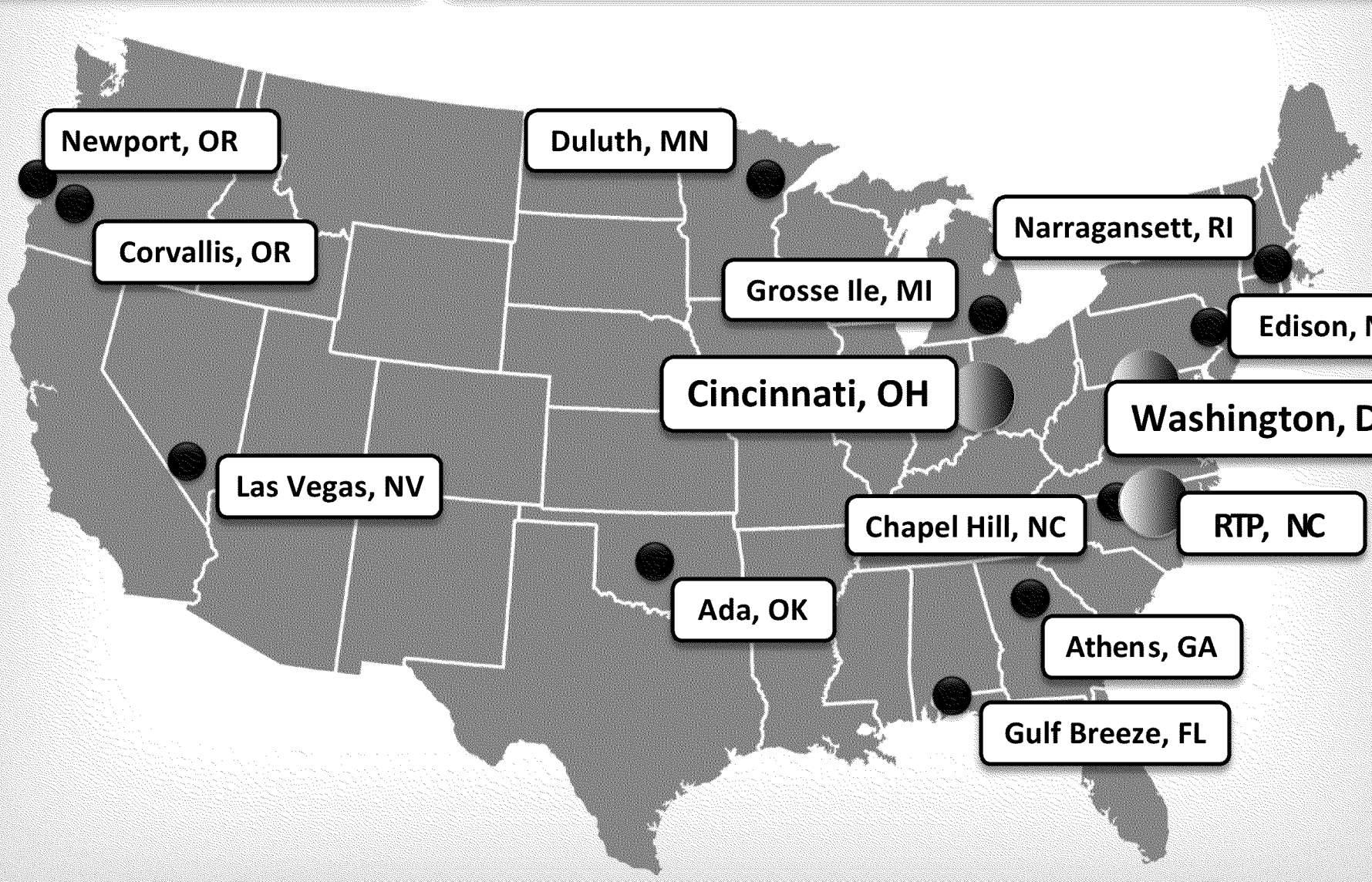


EPA-ORD Research TrianglePark

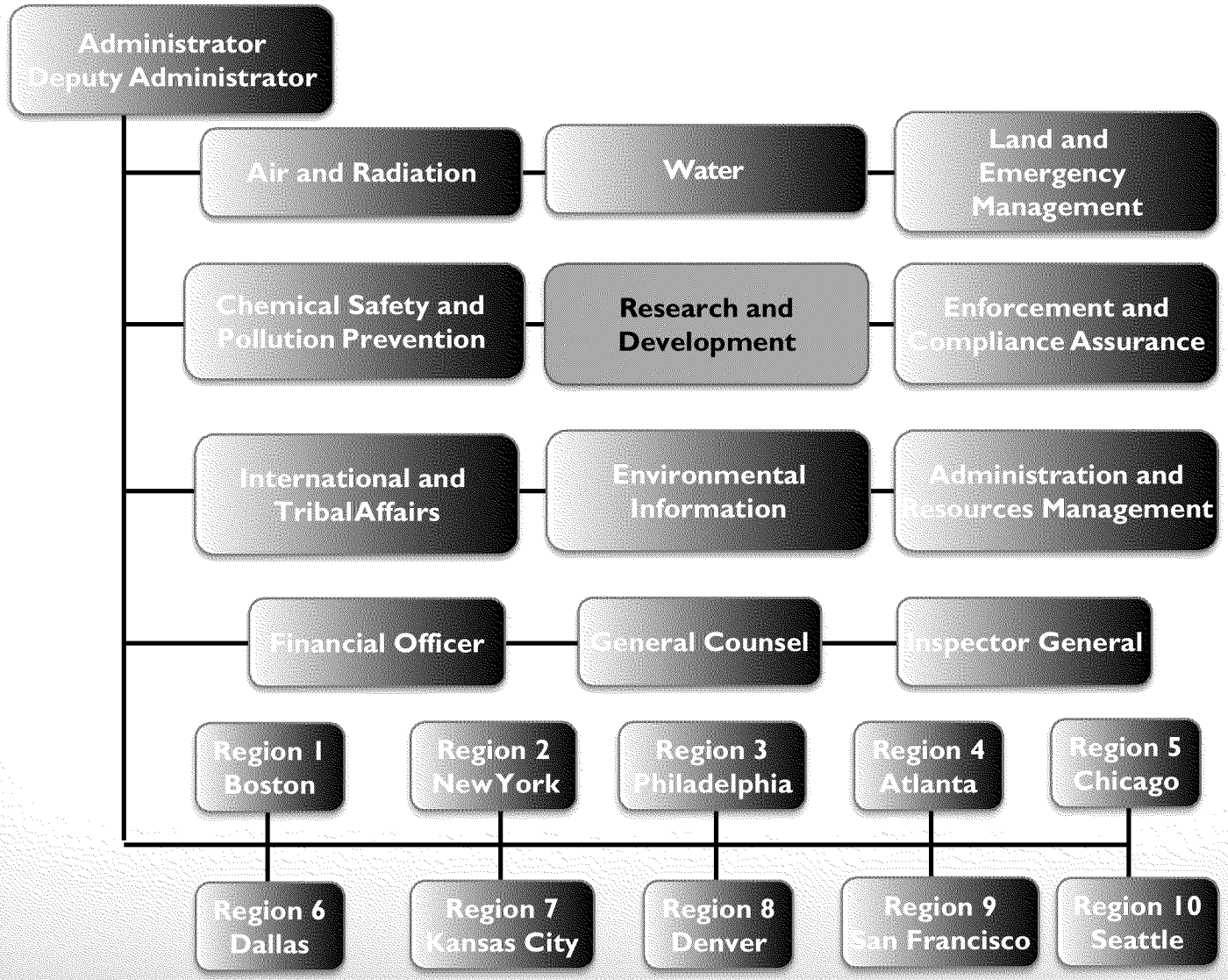


EPA-ORD Cincinnati …

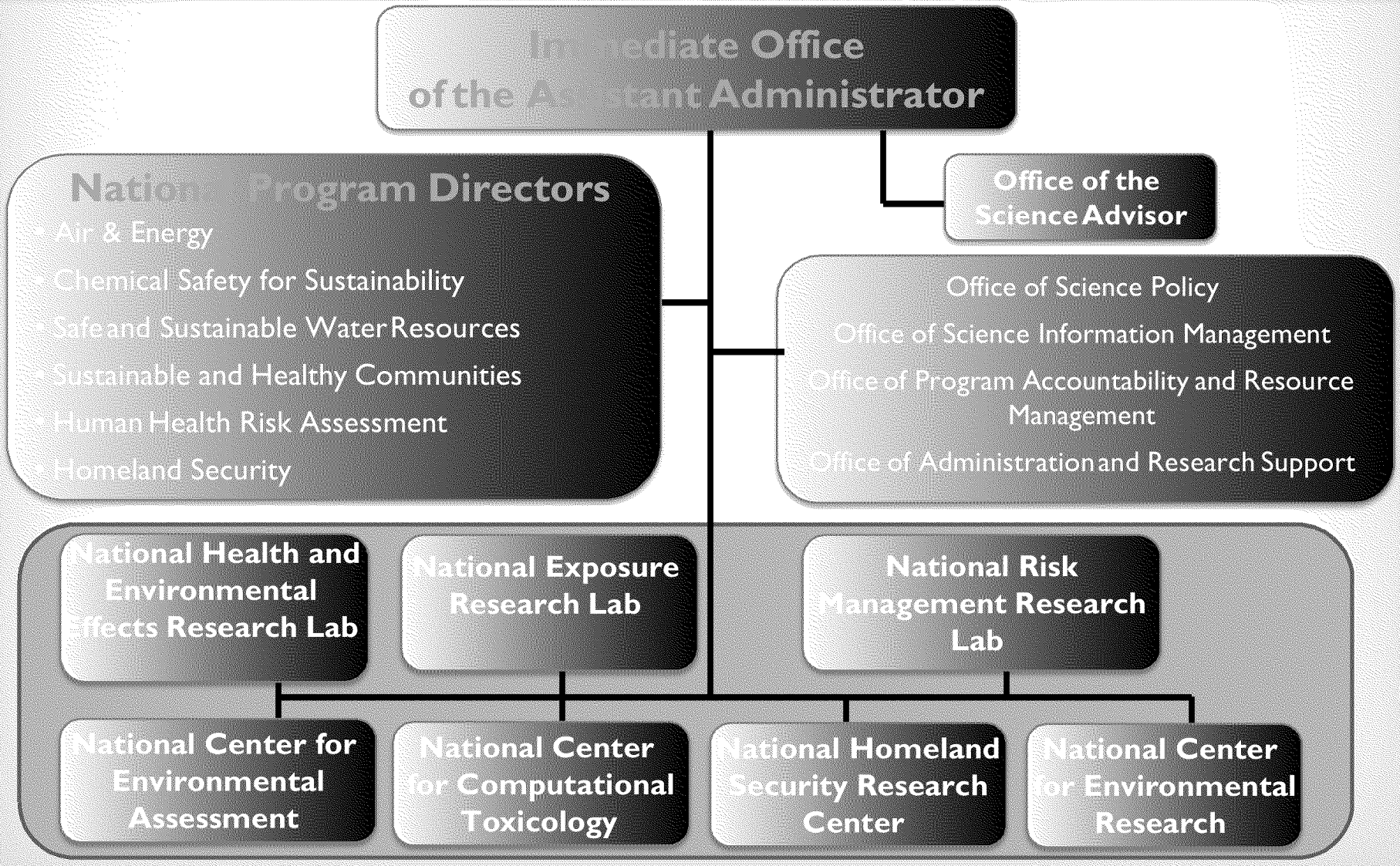
ORD Research Facilities



U.S. EPA Organizational Chart



ORD Organizational Chart



Research Authorizations

- EPA's research provides science that is either required and/or authorized by nearly 50 environmental laws including:
  - **Clean Air Act:** "shall establish a national research and development program for the prevention and control of air pollution."
  - **Comprehensive Environmental Response, Compensation, and Liability Act:** "shall assure the initiation of a program of research designed to determine the health effects (and techniques for development of methods to determine such health effects) of such substance…and in combination with other substances with which it is commonly found."
  - **Toxic Substances Control Act:** "conduct such research, development, and monitoring as is necessary to carry out the purposes of this Act. The Administrator may enter into contracts and may make grants for research, development, and monitoring under this subsection."
  - **Safe Drinking Water Act**: "conduct research, studies, and demonstrations relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and other impairments of man resulting directly or indirectly from contaminants in water, or to the provision of a dependably safe supply of drinking water"

ORD Research Continuum

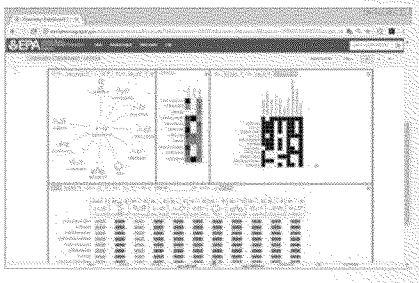
ORD provides the scientific foundation for EPA to execute its mandate to protect human health and the environment.

1. **Longer Term Research:** ORD conducts innovative and anticipatory research applied to a range of EPA program and regional needs in air, water, land, and homeland security to solve longer term major environmental challenges and provide the basis of future environmental protection.
2. **Research on Specific Environmental Challenges:** ORD experts provide research support to EPA program and regional offices, as well as states, tribes, and communities, to help them respond to contemporary environmental challenges.
3. **Technical and Emergency Support:** Because of our expertise, local, state, and national officials come to us for technical support to respond to environmental crises and needs, large and small.

1. Longer TermResearch

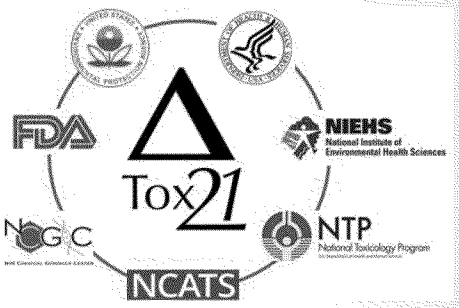
Longer Term Research Example: Computational Toxicology

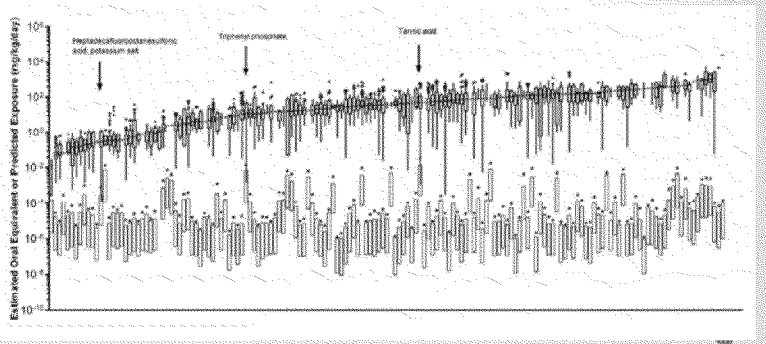
EPA's Computational Toxicology research applies cutting-edge technologies to efficiently and economically evaluate the safety of thousands of chemicals currently in use.



Applications of CompTox research include:

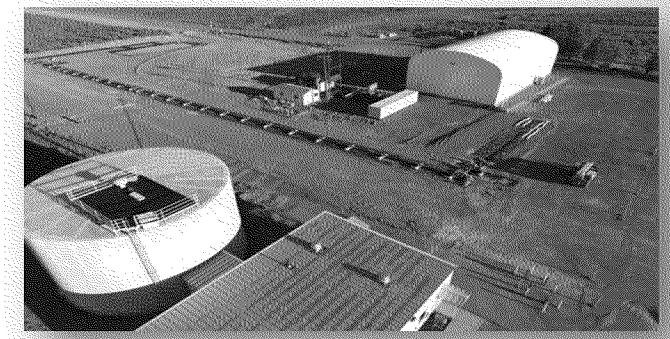
- Use of CompTox data for prioritizing chemicals in EDSP and replacing time and resource intensive Tier I assays
- Deploying CompTox Chemistry Dashboard Behind OPPT CBI Firewall
- RapidTox :
  - TSCA Pre-prioritization Workflow and Underlying Data
  - Prioritization Workflow for OPP Pesticide Inerts
  - Dashboard for OLEM/Superfund Screening Level Assessments
- TSCA Alternatives Strategic Plan
- International use of CompTox data for prioritization (e.g., Canada) and chemical evaluation (e.g., Europe)

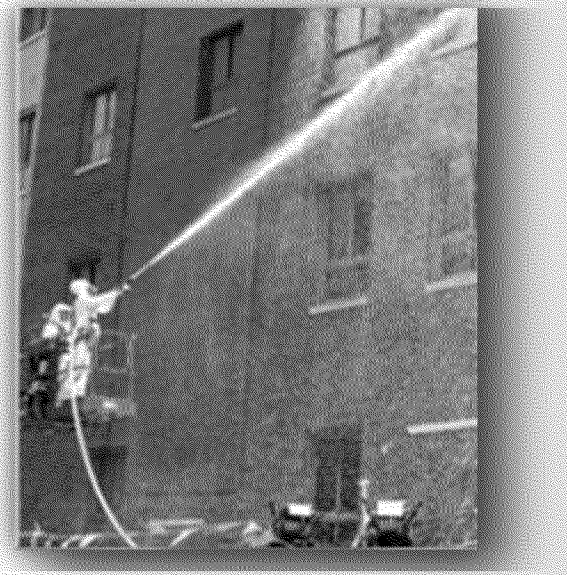




Longer TermResearch Example: Homeland Security Research

- **ORD's Homeland Security Research Program** focuses on improving water systems' security and remediation of wide-area contamination incidents.
- **Advances in decontamination research include:**
  - Identification and testing of several anthrax facility decontamination technologies in partnership with the Department of Homeland Security.
  - Evaluation of chem/bio/rad decontamination techniques in real-world situations to measure the costs and effectiveness of each method, and the expense of managing waste from cleanup.
  - Developing water infrastructure cleanup methods at EPA's Water Security Test Bed thereby giving utilities proven approaches to help to return their contaminated systems to service quickly and effectively.





Other Longer Term Research

- **Sensor Technology Research and Challenges**
  - Creating challenges, prizes, and other incentive-based strategies to find innovative, cost-effective solutions to environmental challenges (e.g., fenceline monitoring of pollution; affordable, real-time, nitrate/phosphorus sensors)
- **National Aquatic Resource Surveys**
  - Supporting assessments of the Nation's waterways and wetlands to compare their condition over time and to support States in managing their aquatic resources
- **Oil Spills Research**
  - Mitigating the effects of past and future oils spills by developing laboratory protocols for the National Contingency Plan Product Schedule, providing guidance on bioremediation following spills, and demonstrating important factors for dispersion of oil into the water column
- **Enabling Local Decisions**
  - Developing tools and approaches to effectively translate science and communicate public health information to people affected by environmental challenges and hazards, such as wildfires
  - Developing tools to help communities understand how a decision, such as building new roads, will impact their local communities and environments
  - Conducting research to understand how ecosystems services, such as clean air and water, fertile soil, and flood control, interrelate with human health and well-being

2. Research on Specific Environmental Challenges

Specific Environmental Challenges: PerfluoroAlkylated Substances (PFAS)

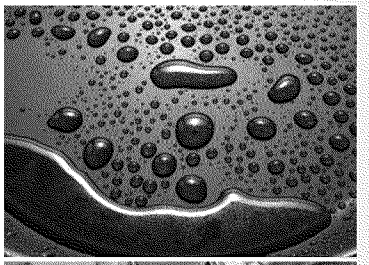
ORD Researchers supporting key priorities:

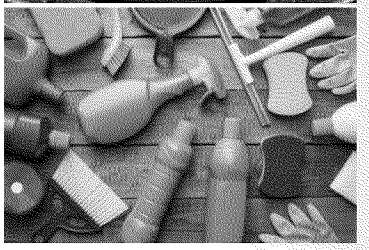
1. **Hazard information**
   Studying the potential hazards of PFAS in the environment using cutting-edge technologies pioneered by our computational toxicology research

2. **Validating methodologies for measuring PFAS in environmental media**
   Developing robust analytical methods for ground, surface, and wastewater and for solids including soils, sediments, and biosolids

3. **Reducing exposure**
   Assisting states and federal partners in the remediation of environmental media, including drinking water

4. **Risk communication**
   Working with ECOS and ASTHO to put together a risk communication plan that can be used nationwide





Specific Environmental Challenges: TSCA Implementation

- **TSCA Implementation**
  - Providing research expertise to evaluate specific chemicals and framing broader assessment activities within timelines mandated by the new law
    - Systematic Review
    - Regulatory Support
    - Chemical Prioritization
    - Risk Evaluation
    - Exposure Estimation
    - Alternative to Vertebrate Testing Strategy

Other Contemporary Activities

- **Chemical Evaluation**
  - **Integrated Risk Information System**
    - Enabling 21st century chemical evaluations
  - **Integrated Science Assessments**
    - Creating evaluations and syntheses of the most policy-relevant science for reviewing the National Ambient Air Quality Standards
  - **Environmental Contaminants**
    - Lead Exposure, Methyl Bromide
- **Harmful Algal Blooms**
  - Monitoring algal blooms and building an early warning indicator system for toxic and nuisance blooms
- **Climate Change**
  - Interpretation, assessments, and development of tools to respond to the changing environment
- **Small Water Systems Research**
  - Tools, training workshops, webinars, and technical assistance to state, local, and utilities personnel so that they can reduce costs and deliver safe, clean drinking water.

3. Technicaland Emergency Support

ToledoDrinking WaterCrisis

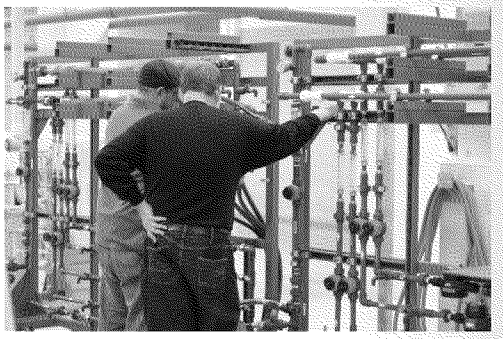
- In August 2014, Ohio EPA and the City of Toledo requested ORD's technical assistance to analyze drinking water for the presence of cyanobacterial toxins resulting in a harmful algal bloom.
- ORD helped identify the best approach for controlling cyanobacterial toxins in the treatment plant and the distribution system.
- Scientists provided rapid, crucial scientific assistance to inform the "Do Not Drink" order that the City of Toledoissued for approximately 500,000 people.
- We then provided critical information to the Mayor of Toledoand the Governor of Ohio to help them make the decision to lift the "Do Not Drink" order.

"When we were faced with an emergency in Toledodue to cyanobacterial toxins detected in their treated drinking water, ORD staff was a great partner and exceeded our expectations in understanding science and helping optimize treatment and restore safe drinking water to our residents." — Ohio EPA Director Craig Butler

Technical and Emergency Support: Lead

Supporting States & Regions:

- Researching methods to improve the ability to identify lead service lines in a non-destructive way (e.g., Flint, MI; Galesburg, IL)
- Assessing composition of pipe scales and treatment progress (e.g., Fall River, MA; Providence, RI; Flint, MI)
- Assisting with review of corrosion control plans and studies (e.g., Sebring, OH; Denver, CO; Providence, RI)

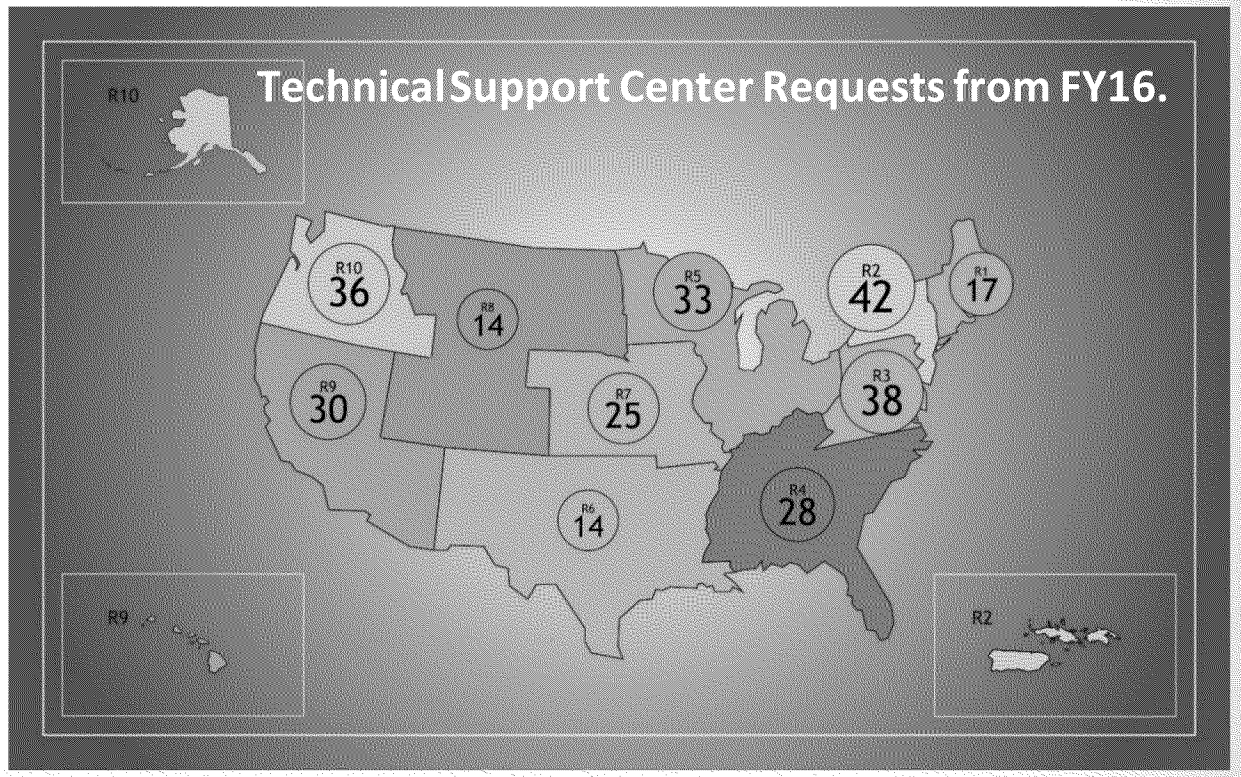


Supporting the Lead & Copper Rule:

- Regulatory option selection
- Multimedia exposure modeling to inform a health-based benchmark for lead in drinking water
- Corrosion control treatment options for various water systems
- Sampling methods for monitoring lead
- Cost and benefits analysis

Technical Support Centers

- ORD has Technical Support Centers that respond to requests from EPA's program offices and regions at Superfund, Resource Conservation & Recovery Act (RCRA), and Brownfields sites.
- For example, historical chemical manufacturing operations at a site in Riegelwood, North Carolina, have resulted in contaminated groundwater, surface water, soil, sediment, and aquatic biota. ORD centers reviewed data collected from the site and made recommendations for additional testing to inform cleanup decisions.



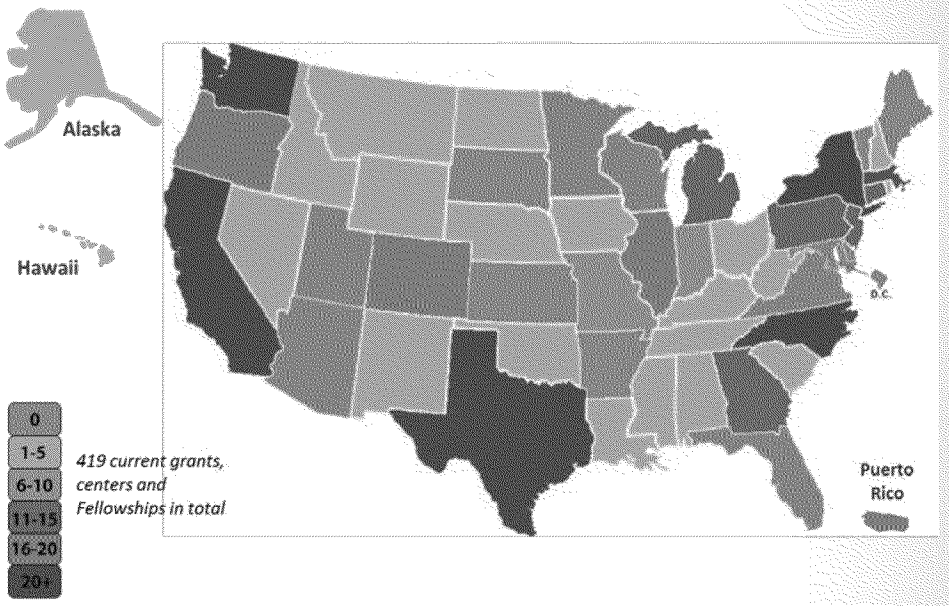
Other Emergency Response

- **ReAChback for Emergency Response**
  - Quick-response scientific support capability to ensure coordinated, timely response to large-scale disasters
- **Corpus Christi, Texas Drinking Water Contamination**
  - Identified decontamination approaches to purge the drinking water systems of the contaminant
- **Ebola Response**
  - Responded to Ebola patients in U.S. by identifying decontamination methods for vehicles, facilities, and Personal Protective Equipment for health care workers, technical support for waste management, and the fate of the virus in wastewater
- **Gold King Mine**
  - Provided toxicity information and developed modeling for long-term monitoring
- **Elevating Critical Public Health Issues Policy**
  - Developed a process to allow staff to expedite the elevation of important issues

Extramural Research

Science to Achieve Results (STAR)

- EPA's STAR program funds research grants through a competitive selection process.
- STAR engages some of the nation's best scientists, engineers, economists, and others in research that complements EPA's own research.
- The map shows extramural research grants, centers, and Fellowships active in FY15.



Small Business Innovation Research (SBIR) Program

- Mandated by the Small Business Innovation Development Act of 1982, EPA's SBIR program povides critical early-stage capital for innovative small companies in the green tech arena.
- Since 1982, SBIR has supported 616 individual small businesses with 1,782 (1329 Phase Is, 453 Phase IIs) awards and around $186,000,000 in 46 states (as of 2016).
- A great SBIR success is the company Ecovative, which developed an innovative technique using mushrooms to create water-resistant, flame-retardant, compostable, heat-trapping insulation that is as strong as concrete by weight.

ORD Research Planning

Aligning Research with Administrator Priorities

- Attaining Air Quality Standards
- Supporting Core Drinking Water and Clean Water Infrastructure Projects
- Restoring Contaminated Sites to Productive Use, Creating Jobs and New Economic Opportunities
- Implementing TSCA Reform Legislation, Instilling New Confidence and Safety for American Families
- Ensuring Sound Science and Research
- Detecting Non-Compliance and Performing Required Field Inspections

Aligning Research with EPA Draft Strategic Goals
Administrator Priorities: Back to Basics

Goal 1 : Core Mission

Goal 3: Rule of Law

- **Goal 1: Deliver real results to provide Americans with clean air, land and water.**
- **Goal 3: Administer the law, as Congress intended, to refocus the Agency on its statutory obligations under the law.**

Objective 1.3 & 3.2:

Revitalize Land & Prevent Contamination

Prioritize Robust Science

- **Refocus EPA's robust research and scientific analysis to inform policy making.**

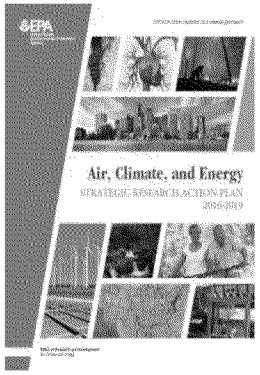
ORD National Programs

- **Air & Energy (A&E)**
- **Safe & Sustainable Water Resources (SSWR)**
- **Chemical Safety for Sustainability (CSS)**
- **Human Health Risk Assessment (HHRA)**
- **Sustainable & Healthy Communities (SHC)**
- **Homeland Security Research Program (HSRP)**

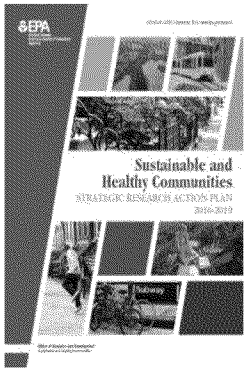
ORD Strategic Research Action Plans

- Describe our research program over 2016-2019 for internal and external audiences
- Cross-Cutting Research Roadmaps show how topics (nitrogen; children; climate; environmental justice) are integrated across the 6 ORD programs
- Additional emphasis in focus areas like public health and social sciences
- Developed in consultation with EPA partner offices, regions, other stakeholders and advisors--our guide for resource planning activities
- Implemented by ORD's Labs and Centers
- Planning and progress are reviewed by the Board of Scientific Counselors

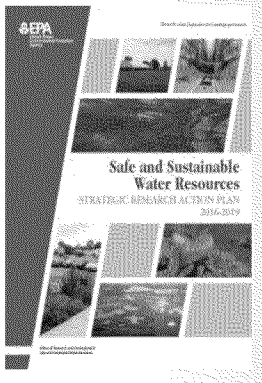
Air, Climate & Energy



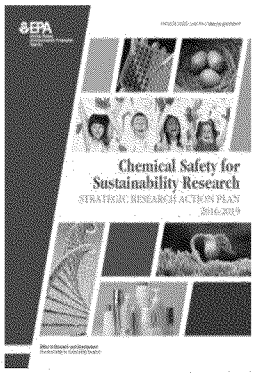
Sustainable & Healthy Communities



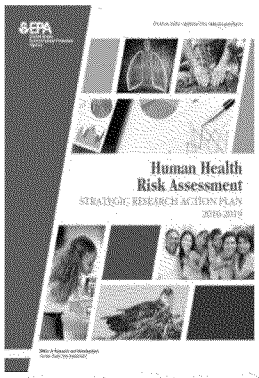
Safe & Sustainable Water Resources



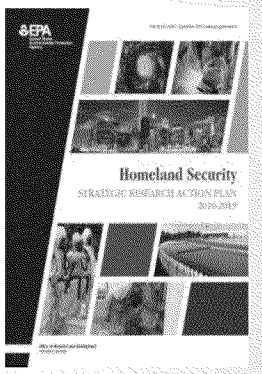
Chemical Safety for Sustainability



Human Health Risk Assessment



Homeland Security



http://www.epa.gov/research/strategic-research-action-plans-2016-2019

StRAP Update in 2018

- ORD will be updating the Strategic Research Action Plans in 2018 for 2019-2022
- Activities will involve close engagement with EPA Programs and Regions, States (through ECOS, ASTHO, etc.) and other partners on priorities
- The updates will incorporate Administration priorities as expressed in the [draft] EPA Strategic Plan and the Administrator's emphasis on States and Statutes
- The updates will accord ORD the opportunity to advance translational science, social science, and other previous BOSC recommendations
- The updates will facilitate responsiveness to budgetary realities
- The BOSC will be centrally engaged for input as peer reviewers in the StRAP revisions

Role of the BOSC

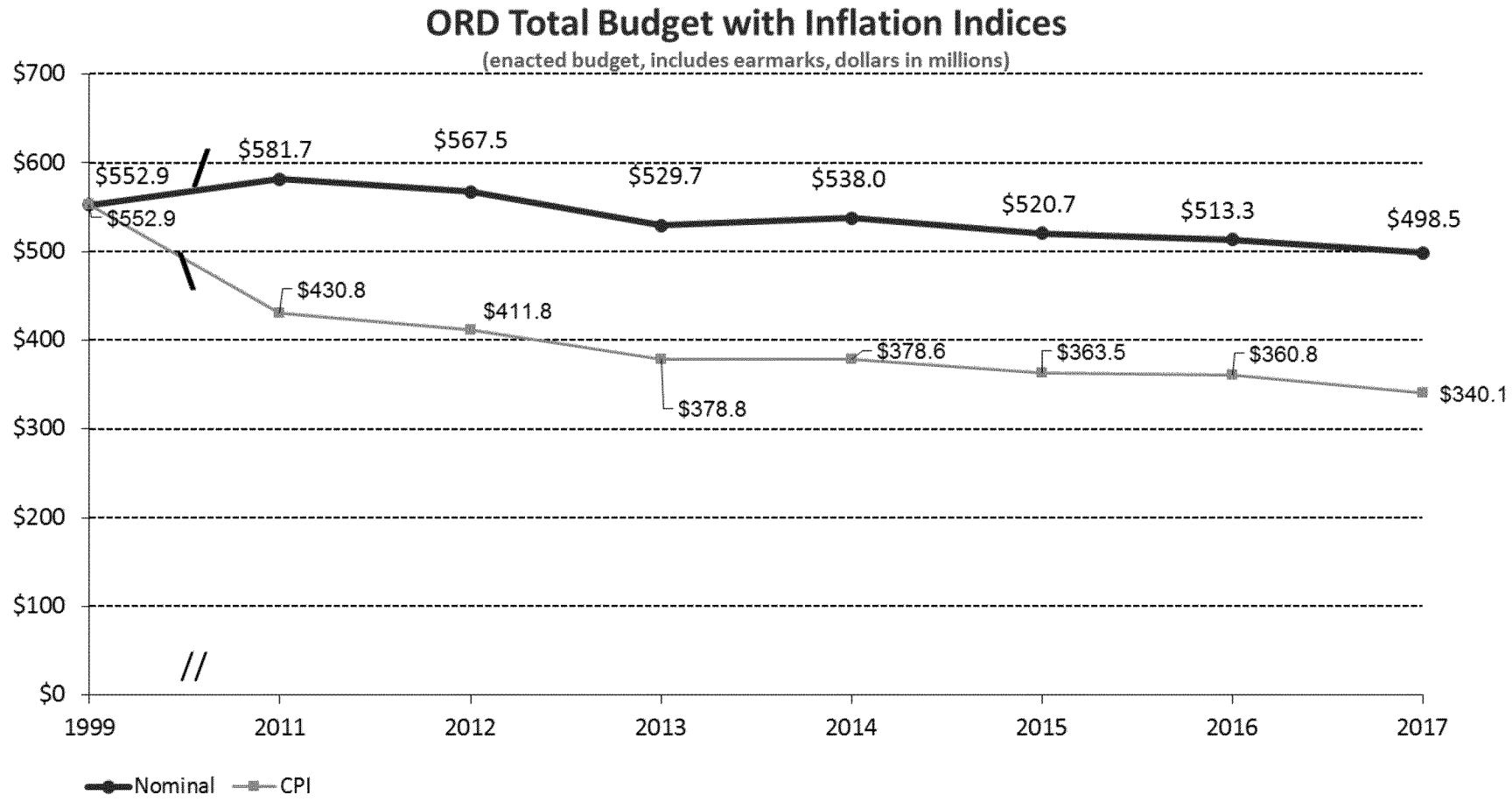
- The BOSC Executive Committee will focus on review of cross-cutting issues and Subcommittee products
- BOSC Subcommittees will be engaged in peer review of their relevant, updated, Strategic Research Action Plans
- BOSC Subcommittees, over ensuing years:
  - May focus on the full National Program or specific topics
  - Can expect at least 3 meetings of each Subcommittee over the course of the updated StRAPs (FY 2019-2022)
  - Will work with their DFOs and NPDs to develop a multi-year calendar for engagement
  - Should expect that interactions will be variable by Program
  - Will have their Subcommittee reports reviewed by the BOSC Executive Committee prior to submission to EPA

Responding to BOSC Recommendations

- ORD has a strong record of responding to BOSC recommendations
- Examples:
  - Social Science: Expand and strengthen ORD's consideration of social science contributions to our research
  - Translational Science: Increase support for translational science, the process of turning observations in the laboratory, field, clinic, and community into knowledge to support decisions, interventions, or best practices that improve environmental quality and public health.
- Implementation:
  - Hiring of a senior social/behavioral scientist in the ORD-IOAA
  - Increased direct funding of translational science activities in programs
  - Developing translational science pilots in the StRAP refresh process

ORD Budget Information

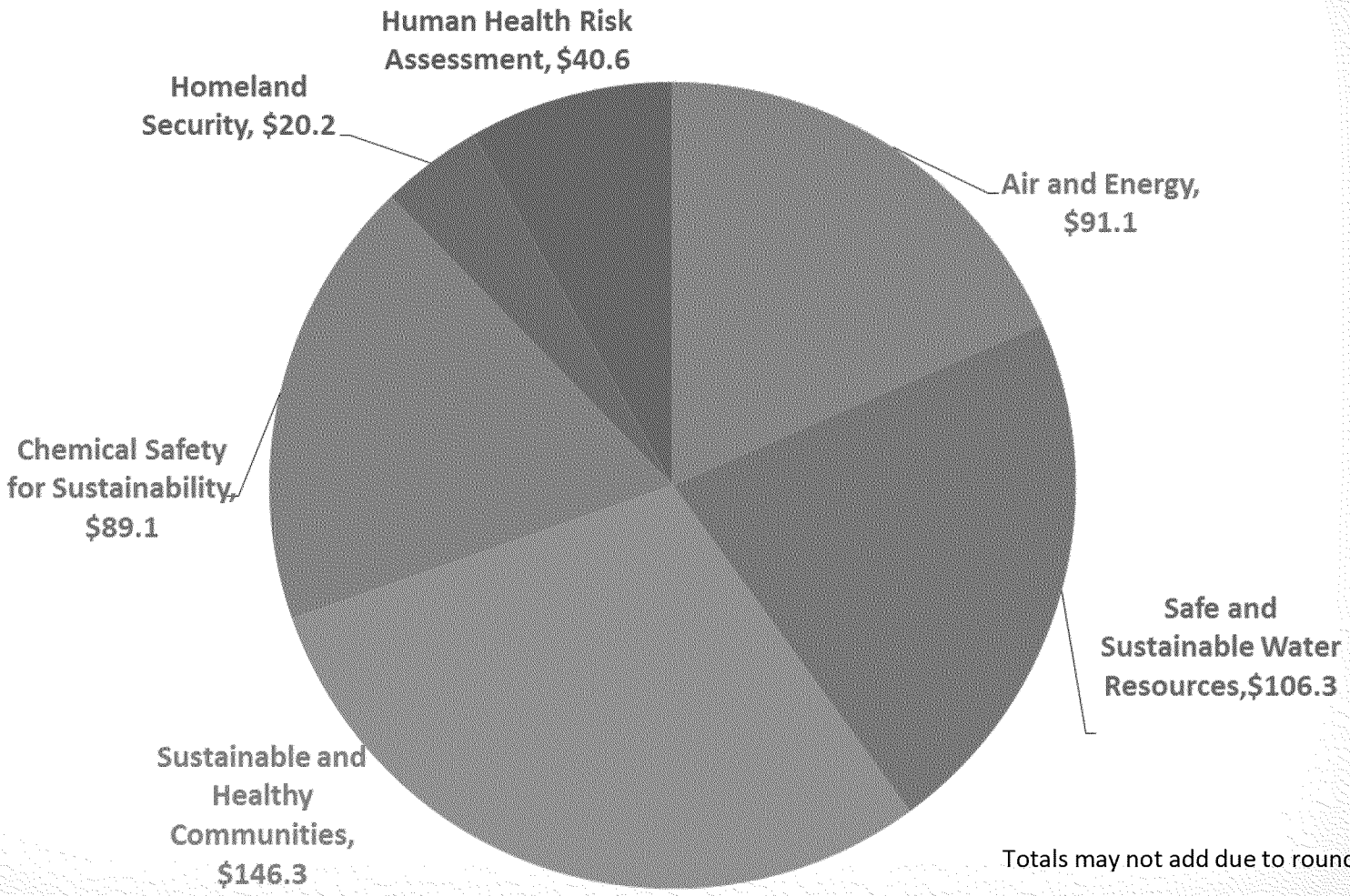
ORD Resource Trends



Source: Bureau of Labor Statistics: CPI Inflation Calculator

// - Denotes non-linear changes in resources between 1999-2011.

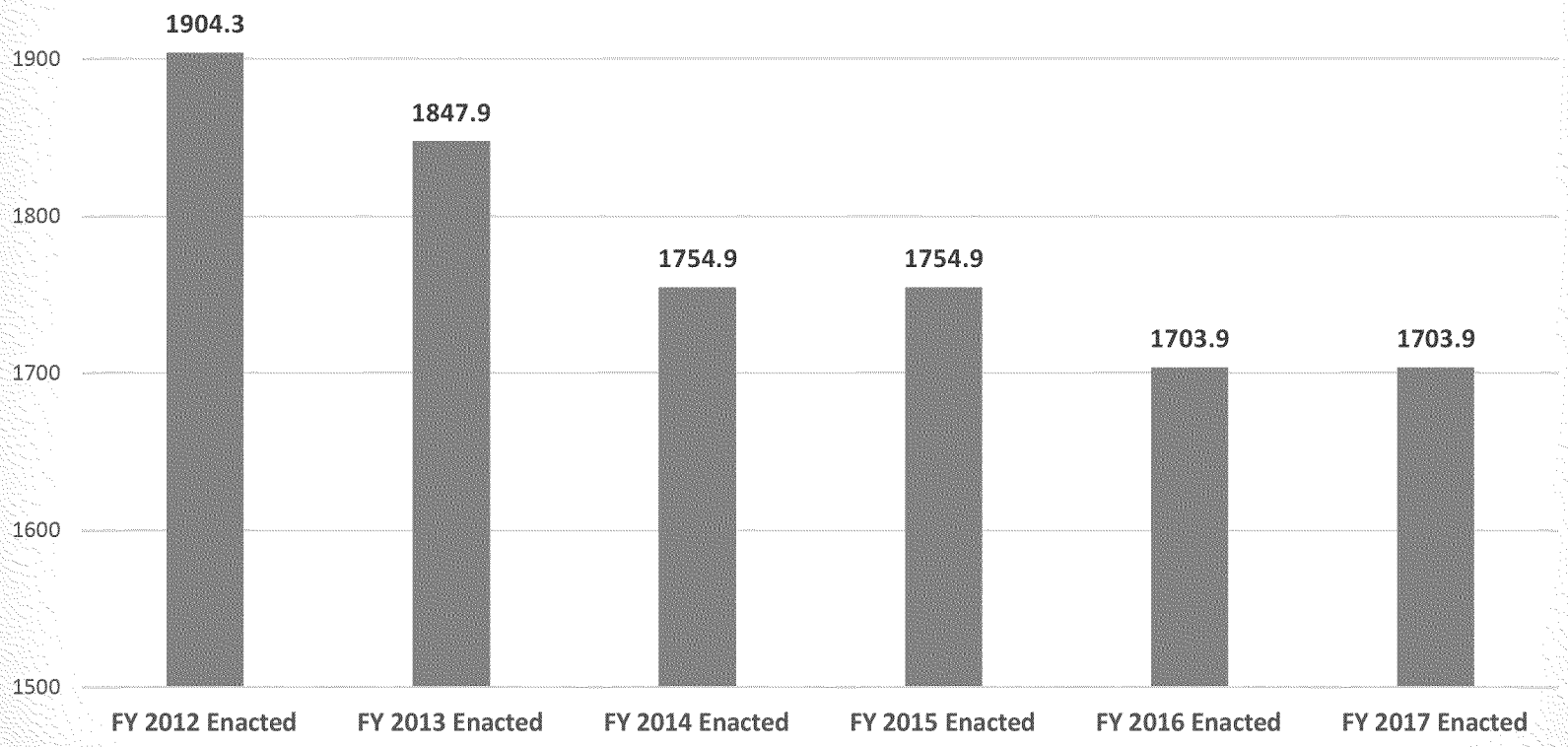
ORD's FY 2017 Budget by Research Program Projects



Totals may not add due to rounding

ORD FY 2017 Enacted Operating Plan (funding levels do not include the Congressional Rescission)

ORD Budget FTE
FY 2012 to FY 2018



ORD Support to EPA Regions and States

ORD's Regional Science Program

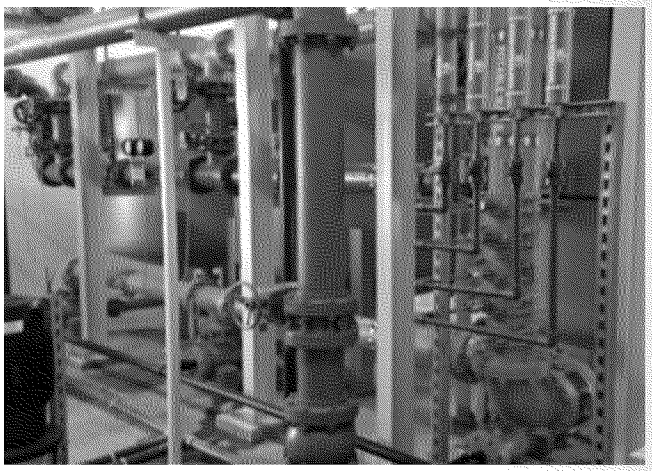
The Regional Science Program links ORD with EPA's regional offices and promotes the integration of ORD science into regional and state decisions.

- Builds networks and partnerships between ORD and regional office staff
- Coordinates programs involving regionally-focused research that often includes a state or local partner and addresses high priority science needs
- Provides technical support to regions, states and communities
- Key components include:
  - Regional Applied Research Effort – responds to high priority, near-term applied research needs of EPA's regions, state and local governments, and tribes
  - Regional Research Partnership Program – A short-term training program that provides opportunities for regional scientists to work with ORD researchers
  - Regional-ORD Community of Science Networking Program – A networking program for regional scientists and engineers who have limited familiarity with ORD

State Engagement

State agencies work on the front lines of protecting public health and the environment and rely on EPA's science-based tools, approaches and methods, technical support and training.

- State Research Needs
  - Through ECOS/ERIS surveys, ORD better understands the science needs of state environmental agencies
- Memorandum of Agreement with ECOS and the Association of State and Territorial Health Officials (ASTHO)
  - Two ORD pilots on Wildfire Smoke Guide and C-FERST
- Webinars on research products and tools
  - *EPA Tools & Resources* monthly series addresses state identified priority areas and provides a mechanism for state input on ORD research
- Outreach and collaboration
  - Lab visits to share ORD scientific capabilities and discuss research topics of interest to states



"Ammonia residual in the distribution system can cause nitrification and other operational 'nightmares.' This EPA ORD supported pilot project in Palo is successful and the use of biologically active filters is an innovative, emerging drinking water technology that can be a viable option for certain other systems."
— Bill Ehm, Director,Environmental Services Division, Iowa Dept of Natural Resources

State Research Priorities

- **Water Quality**
  - Nutrients
  - Stormwater
  - Water reuse
  - Wastewater infrastructure
  - Small system drinking water and wastewater treatment
- **Emerging Contaminants/Toxics**
  - Manage new chemicals of emerging concern and existing chemicals (e.g. PFAS)
- **Waste/Remediation**
  - Soil
  - Groundwater
  - Surface water
  - Sediment
- **Air**
  - New ozone standard
  - Interstate and cross-border transport

2016 ERIS States' Research Needs Survey Summary:
https://www.ecos.org/wp-content/uploads/2017/04/ERIS-Survey-Summary-One-Pager.pdf

National Programs: Brief Introduction

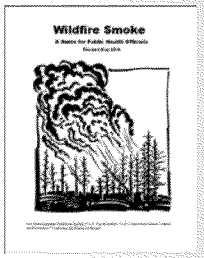
Air & Energy (A&E)

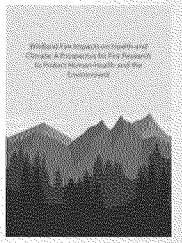
- The Air & Energy research program focuses on the Administrator's priorities of
  - Providing timely, high quality, and relevant scientific information to meet the needs of partner Programs and Regional offices;
  - Design effective air quality management strategies;
  - Provide state-of-the-art tools that states use to identify effective emission reduction strategies.

- Accomplishments & Projected Activities
  - Improved affected communities' understanding of wildland fire emissions and improved air quality modeling of fires.
    - Initiated a Wildland Fires Sensors Challenge to encourage the development of low-cost, easy to deploy air pollution sensors.
    - Developed the Smoke Sense application to provide information directly to the public on air quality, and strategies to reduce smoke exposure to protect public health
    - Updated the Community Multiscale Air Quality Modeling System (CMAQ) to estimate air quality impacts from wildland fires.
  - Will conduct research to provide information to the public on how to reduce health impacts from wildland fires.

Wildland Fire Related Research

- **Toxicology studies** are ongoing to differentiate how wildland fire smoke impacts human health compared with a typical urban environment
- **Health communication** information "Wildfire Smoke: A Guide for Public Health Officials" is available at the AIRNOW wildland fire site
- **Smoke Sense App** development - intended to understand effective health risk communication strategies for people impacted by wildfire smoke
- **Wildland Fire Sensors Challenge** - intended to stimulate development of low-cost, light-weight, accurate, and easily deployable sensor technology for first responders and public health agencies during wildland fires
  - Learn more at https://www.challenge.gov/challenge/wildland-fire-sensors-challenge/
- **Improved emissions and air quality modeling of wild and prescribed fire**; recent field work in Flint Hills, KS for Region 7 RARE; early stages of planning field work and model development focused on prescribed burning in the southeast United States.
- Working toward a **comprehensive survey/inventory of EPA research** related to wildland fire (wildland fire research prospectus)





Sustainable & Healthy Communities (SHC)

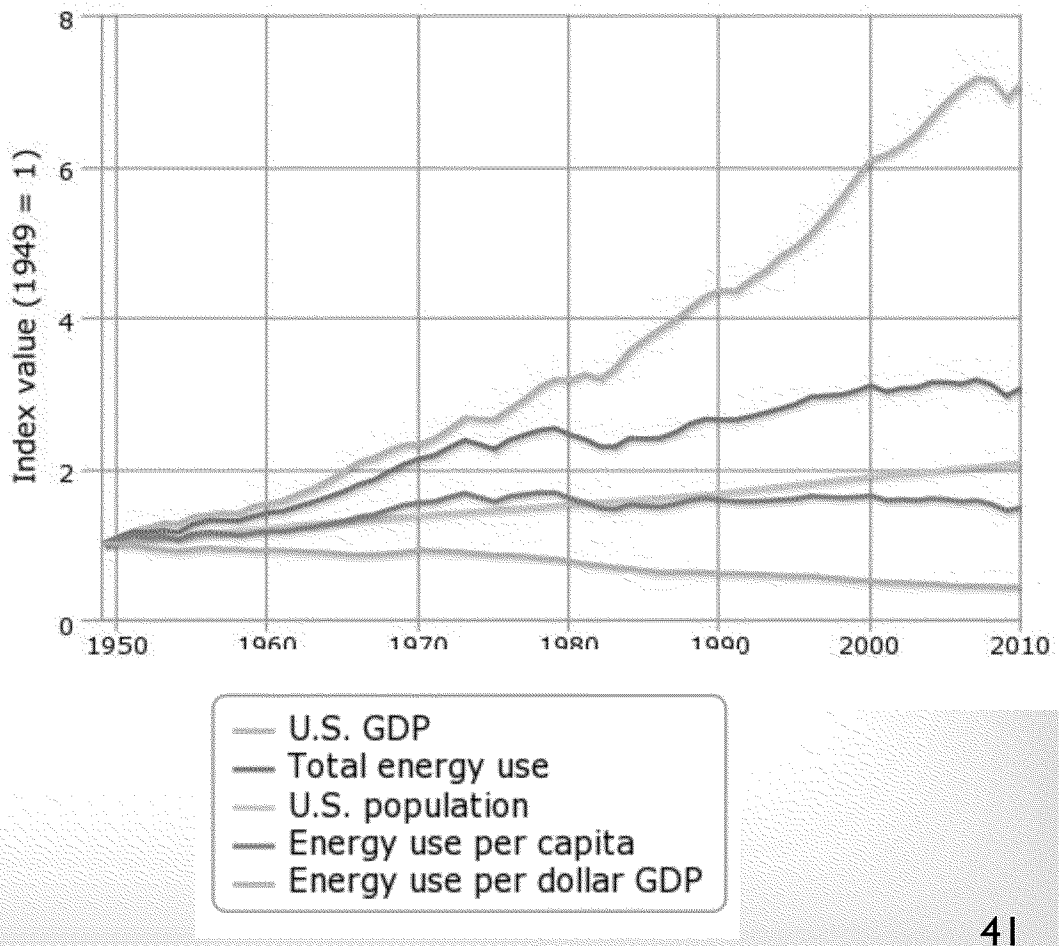
- The Sustainable & Healthy Communities (SHC) research program focuses on the Administrator's priorities of
  - Remediating and revitalizing contaminated sites;
  - Understanding the relationship between environmental quality and public health, especially in vulnerable groups (children and EJ communities);
  - Managing wastes in a beneficial manner to prevent land, water & air contamination;
  - Reporting on the status & trends of environmental conditions through the ROE

- Accomplishments & Projected Activities
  - Research on Contaminated Sites
    - Innovative technologies for site characterization & remediation
    - Contaminated groundwater & sediments – a critical issue at 85% of sites
    - Technical Support Centers - Responding to over 300 requests/yr
  - Lead Exposure Modeling to Protect Children's Health
  - Aid State & Local decision-making on the role of ecosystem services & public health outcomes
  - Continue to Update the Report on the Environment (ROE)

Report on the Environment

- **Presents the best available indicators of national trends in the environment and human health:**
  - Air
  - Water
  - Land
  - Human Exposure and Health
  - Ecological Condition
  - Sustainability
- **Web-based**
- **Draft undergoing Science Advisory Board Review**
- **Future: expanding sustainability indicators; strengthening analysis tools**

Sustainability indicator: Intensity of US Energy Consumption



Safe & Sustainable Water Resources (SSWR)

- The Safe & Sustainable Water Resources (SSWR) research program focuses on the Administrator's priorities of
  - Developing reliable and cost-effective solutions for current, emerging and long-term water infrastructures and resources challenges;
  - Informing policy making and assistance to states.

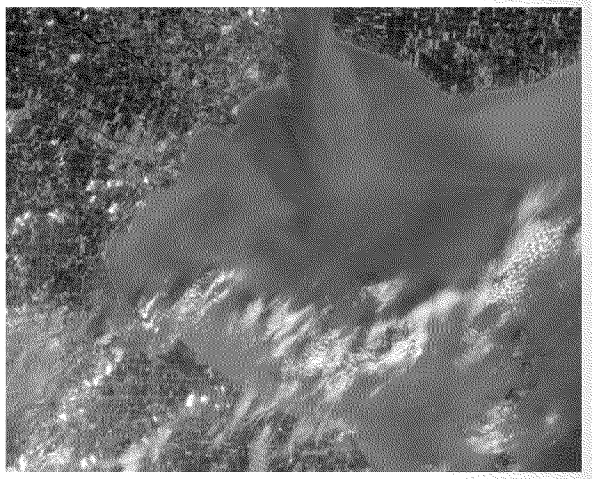
- Accomplishments & Projected Activities
  - Developing methods to detect Per and Polyfluoroalkyl Substances (PFAS) in drinking water
    - develop and validate methods for 24 PFAS in ground, surface, drinking and waste waters; as well as for soil, sediment and biosolids.
  - Developing user-friendly, web-based National Stormwater Calculator
    - assist communities in reducing stormwater runoff from a specific site using various low impact development options and providing cost/benefit information
  - Developing methods and models for monitoring pathogens at beaches
    - develop methods for same-day notifications of pathogens in recreational waters to better inform beach closure decisions, which could save $5-50M per year in public health care expenses.

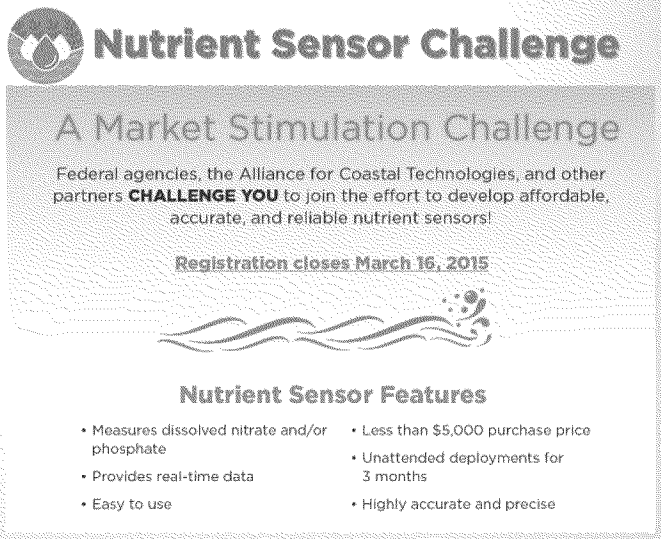
Nutrient Pollution

Objective: Assess ecosystem, economic and social benefits of management actions for sustainable nutrient loading.

Research areas:

- **Reducing impacts of harmful algal blooms**
  - Collaboration with NASA
  - Open challenge for Cyano predictive modeling and mobile app
- **Improve thresholds & targeting actions**
- **Improve nutrient management practices, metrics of benefits, accountability, and communication**
  - Open Challenge: Nutrient sensor development





Chemical Safety for Sustainability (CSS)

- The Chemical Safety for Sustainability (CSS) research program focuses on the Administrator's priorities by:
  - Providing methods, data, models and tools to help make better-informed, more-timely decisions about chemicals, many of which have not been thoroughly evaluated for potential risks to human or ecological health.
  - Strengthening the Agency's ability to evaluate and predict impacts from the use and disposal of manufactured chemicals.
- Accomplishments & Projected Activities:
  - Providing direct support for implementation of chemical legislation (TSCA, FIFRA, FQPA, SDWA) through advancement and application of new chemical assessment methodologies, including computational toxicology and exposure approaches (ongoing).
  - Delivering comprehensive chemical information to decision-makers, informing chemical prioritization and evaluation (Chemical Dashboard, ECOTOX Knowledge Base, SeqAPASS, CPDAT) (ongoing).
  - Expanding the breadth and depth of information on chemical toxicity and exposure using high-throughput methodologies (TOXCast) and improved bioassays (ongoing).
  - Developed analytical framework to support decisions on engineered nanomaterials throughout their life-cycle (ongoing, with future activities contingent on funding).

Shift the Paradigm of Toxicity Prediction

- **CSS research is informing the shift away from using laboratory animal studies as the ultimate gold standard in toxicology**
- **Shift is needed to increase the depth and breadth of understanding of environmental chemicals through better understanding of biological mechanisms. Research directions include:**
  - Development of new bioassays that increase breadth of knowledge concerning environmental chemicals (e.g. developmental neurotox; assays for volatile organic compounds)
  - Investment in virtual tissue modeling to better understand multicellular impacts (e.g. STAR Centers to develop organotypic culture models (OCMs) for high-priority biological systems; computer simulation of tissue-on-a-chip microscale systems)
  - Development of adverse outcome pathways that link bioassay results and virtual tissue modeling to apical endpoints (large investment in AOP development and collaboration with OECD on AOPWiki)
  - Benchmarking new assessment methodologies (NAM) with comparison of *in vivo*, *in vitro* and *in silico* toxicology approaches (e.g., IVIVE)
  - Incorporating toxicokinetics into high-throughput screening and computational toxicology
  - Investing in computational exposure approaches to better estimate total and near-field exposures, such as those from use of consumer products (e.g. CPDAT and the Human Exposure Model) and chemical life-cycle assessments.

Homeland Security Research Program (HSRP)

- The Homeland Security Research Program carries out translational science with EPA programs/regions, federal partners, and other stakeholders, to help carry out the Administrator's priorities to:
  - Support EPA's efforts to help communities prepare for, absorb, and recover from disasters;
  - Remediate contaminated environments affected by incidents.
- Accomplishments & Projected Activities
  - Developed wide-area cleanup approaches
    - Completed a multi-agency cleanup demonstration of a biothreat agent-contaminated subway system.
  - Improved water system restoration
    - Completed water infrastructure cleanup studies vital to the water sector
  - Built capabilities to characterize large disasters.
    - Developed composite sampling approaches to support faster characterization of wide areas
  - Developing characterization and decontamination approaches for chem/bio/rad agents;
  - Assessing and improve scalable decontamination technologies.

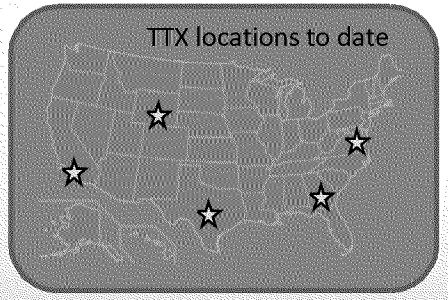
Working with Partners on Security

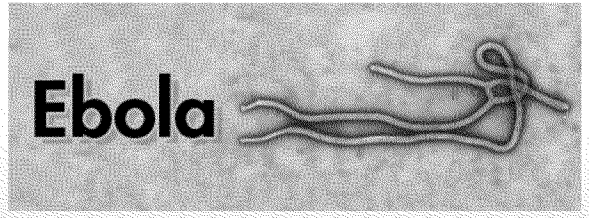
Water Systems

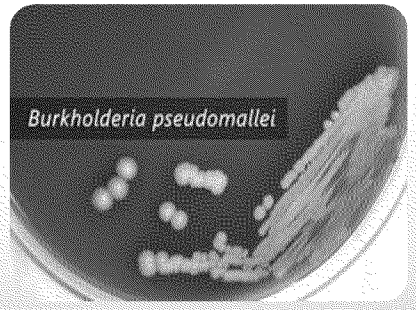
- Creation of Contamination Warning Systems used by many domestic and international utilities
- Supporting response to water contamination incidents (harmful algal bloom, MCHM spill)
- Supporting OW guidance and exercises
  - Water Contaminant Information Tool used by utilities during emergencies
  - Tabletop exercise (TTX) on contamination of waterways and water infrastructure

Indoor/Outdoor Cleanup

- Supporting Emergency Response
  - Ebola Outbreak – our research, expertise used for cleanup and waste management
  - Lab Clean-ups from DOD *Bacillus anthracis* Samples
  - *Burkholderia* Release at TulanePrimate Center
- Supporting Guidance and Product Registrations
  - Underground Transport Restoration Guide
  - NYC Environmental Response and Remediation Plan for Bio-incidents
  - FIFRA exemptions for *B. anthracis*







Human Health Risk Assessment (HHRA)

- The Human Health Risk Assessment (HHRA) research program focuses on the Administrator's priorities of
  - Sustaining EPA's commitment to developing agile, fit-for-purpose portfolio of robust and responsive scientific assessment products that characterize risks and potential impacts to human health and the environment;
  - Applying scientific assessments to inform EPA actions on safety of chemicals; cleaning up, revitalizing and returning land back to communities; providing clean and safe water; and improving air quality;
  - Applying rapid risk assessment tools to respond to emerging, often crisis-level environmental contamination issues.
- Accomplishments & Projected Activities
  - Released final IRIS assessments for Benzo[a]pyrene and Ethylene Oxide
  - Released final ISA for Sulfur Oxides- Health Criteria to support NAAQS
  - Continue to develop IRIS and PPRTV assessments to inform EPA's decisions at contaminated Superfund, Brownfields, and hazardous waste sites.
  - Continue to provide research and technical support to deliver safe drinking water, with focus on known and emerging chemical and biological contaminants.